9.0 Institutional Controls

Institutional controls are legal or administrative actions that help ensure the long-term protectiveness of the remedy. At this site, the selected remedy in the ROD consists of three types of institutional controls.

(a) First, the City of Seattle placed a notice in the records of real property kept by the King County auditor, alerting any future purchaser of the landfill property, in perpetuity, that this property had been used as a landfill and was on EPA's National Priorities List, and that future use of the property is restricted. The use restriction shall comply with the post-closure use restrictions under the State of Washington's Criteria for Municipal Solid Waste Landfills (WAC 173-351-500(1)(I) and (2)(c)(iii). The deed notice was recorded in the King County records on July 13, 2005.

(b) Second, the City needs to ensure continued operation and maintenance of the containment and monitoring systems if any portion of the property is sold, leased, transferred or otherwise conveyed. This requirement is an element of the 1988 Response Order on Consent.

(c) Third, notices are needed so that no water supply wells are constructed and used in areas with groundwater contamination emanating from the landfill. These notices shall include at a minimum the following:

- The City will annually notify the Seattle-King County Department of Public Health, Ecology, the local water districts (currently, the Kent and Highline Water Districts) and locally active well drillers in writing of groundwater conditions in the affected areas downgradient of the landfill. This notice will include a map showing the location of the affected areas and indicate which aquifers are affected and their elevations. This information shall be updated annually and can be part of an annual groundwater monitoring report. Locally active well drillers are all well drillers that have drilled wells within King County in the year prior to the notice. Ecology will provide the list of locally active well drillers to the City. This requirement for annual notices can be removed or modified by

Ecology after groundwater cleanup standards have been met in the groundwater monitoring wells downgradient from the landfill.

- As an additional protection, state regulations forbid any private drinking water wells within 1,000 feet of a municipal landfill or 100 feet from all other sources or potential sources of contamination (WAC 173-160-171). State regulations (WAC 173-160-151) also require a property owner, agent of that owner, or a water well operator to notify Ecology of their intent to begin well construction prior to beginning work.

- The first annual notice was sent by the City of Seattle on July 22, 2005, to drilling companies holding active drilling licenses for operations in King County. See Appendix D for a copy of the annual notice statement.

9.1 Garbage Removal from Right of Way for State Route 509

Part of the Midway Landfill (waste and closure improvements) is within the Washington State Department of Transportation Right of Way (WSDOT ROW) under various franchise permits. Under the franchise permits, all of the City's improvements must be removed from the ROW in the event WSDOT requires the use of the area.

WSDOT will implement a State Route 509 (SR-509) project that will connect to Interstate Highway 5 (I-5) near Midway. WSDOT has informed the City of Seattle that additional ROW is needed for highway construction. WSDOT has been actively working on this project for over five years. The Environmental Impact Statement has been completed. ROW acquisition, construction of environmental controls, and design work is underway. Full construction is estimated at 95% probable by 2008.

The Washington State Departments of Transportation and Ecology have discussed this project with the City of Seattle. The discussions have useful in identifying impacts to the landfill due to widening of the highway.

This project will add two southbound lanes and one northbound lane to I-5 at Midway. All City facilities and waste within the limits of the new highway construction will need to be removed from the I-5 ROW.

The project elements that have been specifically identified to date are:

- Removal and disposal of approximately 25,000 cubic yards of waste that is in the ROW.
- Retention or re-sloping of the remaining waste to stabilize the eastern margin of the landfill.
- Modifications to the landfill cover system (to allow waste excavation from the ROW and possible disposal in the landfill), including related modifications to the surface water system and the landfill gas system.
- Removal of 11 landfill gas extraction wells that are in the ROW.
- Relocation/reconfiguration of City force main on the east side of I-5.
- Relocation of existing City storm drain lines on the west side of I-5.
- Evaluation of the capacity of the Midway storm water detention pond to accept additional runoff from the highway.
- Backfill required when the waste is removed.

Since 2002, the eleven landfill gas extraction wells have not been needed nor used for gas extraction. The valves to the wells have been closed. In addition, these eleven wells are part of the fluid level monitoring program. Since 2002, these wells have been dry and not useful for the fluid level monitoring program. These wells do not need to be replaced.

9.1.1 Evaluation of Remedy Performance

Site remediation at the Midway Landfill has focused on source control, with control measures installed between September of 1985 and January 1992.

Remediation activities have included landfill gas control, landfill surface filling and grading, storm water detention pond construction and associated permanent dewatering, landfill cap installation, Linda Heights Park storm water diversion, and ongoing environmental monitoring.

Environmental monitoring data collected in 2004 and 2005 continued to demonstrate that the source controls completed in 1992 have been effective in reducing the saturated thickness of the leachate in the landfill, resulting in overall improvements in groundwater chemistry.

Specific conclusions based on the five-year review are as follows:

- Substantial declines in fluid levels were noted between 1989 and 2005. In the past five years, the overall fluid levels in the landfill remained fairly stable, and in many cases continued to decline. Declining water levels within the landfill waste was a goal of the remedy.
- Groundwater flow directions in the Upper Gravel Aquifer and Sand Aquifer have not changed significantly compared to previous data. Groundwater flow directions have changed slightly in the Southern Gravel Aquifer compared to previous data, with MW-30C in a more cross-gradient position with respect to the landfill's influence.
- The overall groundwater chemistry monitoring network is still adequate for monitoring groundwater flow associated with the landfill. MW-30C was originally installed as a sentinel well between the landfill and the Lake Fenwick water supply wells. Over time the flow in this portion of the SGA has migrated slightly to the northeast, away from MW-30C and the Lake Fenwick wells.
- The fluid levels in the seven key hydraulic wells showed decreasing or stable trends. Historic low fluid level measurements were recorded for 2 of the 7 wells (Well 5 and Well 47D) during monitoring round R-46.
- Due to engineering controls, decreased water levels in monitoring wells in the Upper Gravel Aquifer and Sand Aquifer continued to be observed in 2005. This is a benefit to overall water quality at the

Midway Landfill, although individual water samples can no longer be evaluated from some of these wells.

Record of Decision cleanup levels were exceeded for one or more groundwater contaminants of concern in groundwater samples from one upgradient well in the Sand Aquifer (MW-17B) and the four downgradient wells in the Southern Gravel Aquifer (MW-14B, MW-20B, MW-23B, and MW-29B) during one or both of the 2004 sampling events. The Record of Decision cleanup level for vinyl chloride was exceeded one time in Southern Gravel Aquifer well MW-30C, which is located in a cross-gradient position relative to the landfill. A summary of exceedances are tabulated in Table 2. Time-series plots for ROD COCs for downgradient monitoring wells in the Southern Gravel Aquifer wells are attached in Appendix C to illustrate trends over time and the magnitude of concentrations compared to ROD cleanup levels.

- The time-series plot graphs show that most of the tested parameters are stable or decreasing in concentration over time, except for the volatile organic compounds that are steadily increasing in Sand Aquifer upgradient well MW-21B. The volatile organic compounds detected in well MW-21B that are increasing are 1, 1-DCE; tetrachloroethene [PCE]; and trichloroethene [TCE]. The source or sources of contamination upgradient of the Midway Landfill in the Sand Aquifer are still present as indicated by the data from MW-17B and MW-21B. The results from these two wells are showing two different trends over time. The concentrations of several VOCs detected in MW-17B are decreasing while the concentrations of several VOCs in MW-21B are increasing. Downgradient groundwater concentrations of volatile organic compounds in the Sand Aquifer and the Southern Gravel Aquifer continue to be affected by this contamination source.

Table 2. Comparison of 2004 Contaminants of Concern in Groundwater to ROD Cleanup Levels

				Upper Gravel Aquifer		Sand Aquifer						Southern Gravel Aquifer					
				MW-16	MW-21A	MW-8B	MW-8B (DUP)	MW-17B	MW-17B (DUP)	MW-21B	MW-21B (DUP)	MW-14B	MW-14B (DUP)	MW-20B	MW-23B	MW-29B	MW-30C
Analyte	Units	Cleanup Level[a]	Round ID	UP	UP	UP	UP	UP	UP	UP	UP	DOWN	DOWN	DOWN	DOWN	DOWN	see note 'b'
Manganese	mg/L	2.2	R-45	0.082	0.082	0.176	0.175	0.149	0.151	0.445		1.20		5.42	0.203	1.25	0.753
		.2	R-46					0.144		0.437	0.432	1.08	1.09	5.07	0.192	1.15	
1,2-Dichloroethane	µg/L	5	R-45	1 U	1 U	1 U	1 U	9.2	9.3	1 U		1 U		1 U	4.8	6.3	1 U
			R-46					7.9		1 U	1 U	1 U	1 U	1 U	4	6.5	1 U
Vinyl Chloride	µg/L	0.2*	R-45	0.2 U	0.2 U	0.2 U	0.2 U	0.58	0.59	0.2 U		0.51		0.24	0.62	1.0	0.2 U
			R-46					0.5		0.2 U	0.2 U	0.5	0.54	0.24	0.73	1.2	0.22

ROD = Record of decision

R-45 = Round 45, May 2004

R-46 = Round 46, November 2004

a = Clean up levels established in the Final EPA Record of Decision for the Midway Landfill Site, September 6, 2000.

Exceeds cleanup level established in the Final EPA Record of Decision for the Midway Landfill, September 6, 2000.

U = Indicates the compound was undetected at the reported concentration

DUP = Duplicate.

* = The actual cleanup level in the ROD (USEPA 2000) is 0.02 µg/L. However, pursuant to WAC 173-340-707(2), Ecology utilizes the practical quantification limit (PQL) of 0.2 µg/L to determine compliance with this cleanup standard because the cleanup standard is lower than the PQL.

Note: Up or Down in column title denotes whether the well is located upgradient or downgradient of the landfill's influence.

b = MW-30C is a downgradient well in the SGA, but is cross-gradient from the landfill's influence.

- The detected concentrations of vinyl chloride in downgradient Southern Gravel Aquifer wells are likely related to the chlorinated ethenes (PCE, TCE, 1,1-DCE, and cis-1,1-DCE), and ethanes (1,1,1-TCA) detected in upgradient Sand Aquifer wells MW-17B and MW-21B. These compounds are parent compounds that break down to the daughter product vinyl chloride through biological or chemical processes.

- An updated review of regulatory databases indicated four sites located within approximately one-half mile of the Midway Landfill that have confirmed or suspected releases of solvents to groundwater and/or soil. Three of these upgradient sources are in the vicinity of wells MW-17B and MW-21 where volatile organic compounds have been detected in the Sand Aquifer.

The groundwater quality in the Southern Gravel Aquifer appears to be generally stable or improving, except as noted. Increasing concentrations of some volatile organic compounds and inorganic parameters were observed in wells MW-20B and MW-29B until the 2001 to 2003 timeframe, respectively. Since that time, concentrations have slightly decreased. This may be a reflection of the predicted delay between the initiation of source control and improvements in downgradient groundwater quality.

10.0 Conclusions

- Fluid levels in most of the Shallow Groundwater/Saturated Refuse wells have continued to substantially decline over the past five years, demonstrating the continuing effectiveness of engineering controls.
- Concentrations of Record of Decision contaminants of concern in the Southern Gravel Aquifer have generally remained stable or decreased over the past five years, although levels of some contaminants of concern remain above cleanup levels.
- The Southern Gravel Aquifer does not serve as a current source of drinking water and institutional controls prohibit future drinking

water uses. Therefore, despite the existing levels of contaminants, the remedy continues to be protective of human health and the environment.

- Upgradient sources of volatile organic compounds in groundwater continue to be present and will limit the potential for the contaminants of concern in the Southern Gravel Aquifer to decrease below the Record of Decision cleanup levels. Vinyl chloride is a daughter product of the ethenes and ethanes detected in upgradient wells, and both vinyl chloride and 1,2-dichloroethane are also present upgradient of the landfill.

11.0 Progress since Last Review

This is the first five-year periodic review.

The main activities at this site since the ROD have been monitoring of landfill gases, groundwater, and surface water. The final revisions to the consent decree and restrictions to the deed of the landfill property were agreed upon between the City of Seattle and the Washington Department of Ecology.

The fluid level monitoring program was modified in 2002, with agreement by the Department of Ecology, to cease monitoring of ground water wells that have either gone dry or were not producing useful data.

12.0 Five-Year Review Process

This period review was performed by Ching-Pi Wang, Washington State Department of Ecology site manager for the Midway Landfill. Documents reviewed in preparation of this five year review included: recent annual ground water and landfill gas monitoring reports, the Record of Decision, and remediation status report for the landfill.

The five-year review was not reviewed by the Public Health Seattle & King County per their letter dated March 15, 2005 (see Appendix B). A copy of the final version of this review will be sent to the health district for their records.

The local community in the vicinity of the landfill was notified of the upcoming five year review by a notice in Ecology's Site Register in March 2005. No inquiries of Ecology received

A 30-day public comment period will be held in September, 2005. The comment period will include mailing a fact sheet to the interested public, placing the draft periodic review in public repositories for review, and placing the draft periodic review on the web.